

CLAIMS

1. A process for converting a fuel into reformulated fuel for use in a fuel cell or other energy-producing systems, the process comprising the steps of fractionating the fuel into a light fractionate and a heavy fractionate, and reformulating the light fractionate in a steam reformer into a reformate which is suitable for use as a fuel for the fuel cell or other energy-producing device.
2. A process as in claim 1 in which the fractionating step is carried out by a step selected from the group consisting of boiling point fractionation, vacuum fractionation, vacuum distillation, filtration, membrane separation, and adsorption.
3. A process as in claim 1 and further including the step of desulfurizing the light fraction.
4. A process as in claim 3 in which the desulfurizing step is carried out by a step selected from the group consisting of adsorption and hydrodesulfurization.
5. A process as in claim 1 in which the reformulating step is carried out by reforming the light fractionate at a temperature below 600°C to produce a first reformate, and reforming the first reformate at a temperature above 650°C to produce a second reformate.
6. A process as in claim 1 including the step of burning the heavy fractionate to produce heat, and adding the heat to the steam reformer in the reformulation step.
7. A process as in claim 1 in which the step of burning the heavy fractionate is carried out by the steps of wicking the fuel to a heated surface, vaporizing the fuel from the heated surface, partially mixing the vaporized fuel with air, and stabilizing the flame on porous screens surrounding the wick and flame .
8. A process for converting a fuel into heat and a second fuel for use in a fuel cell or

in other energy producing devices, the process comprising the steps of fractionating the fuel into a light fractionate and a heavy fractionate, and directing the heavy fractionate into a holding vessel for subsequent use as a fuel which is suitable for burning to produce heat or other energy.

9. A process as in claim 8 and further including the step of directing a portion of the heavy fractionate in heat exchange relationship with the fuel before the fractionating step.
10. A process as in claim 8 and further including the step of burning a portion of the heavy fractionate in the holding vessel to produce heat.
11. A process as in claim 8 and further including the step of desulfurizing the light fraction to produce a desulfurized fuel.
12. A process as in claim 11 in which the desulfurizing step is carried out by a step selected from the group consisting of adsorption and hydrodesulfurization.
13. A process as in claim 11 including the step of using the desulfurized fuel to drive an engine or combustor that has catalytic components.
14. A process as in claim 8 and further including the step of reformulating the light fractionate into a reformat which is suitable for use as a fuel for the fuel cell or other energy-producing device.
15. A process as in claim 14 and further including the steps of burning a portion of the heavy fractionate in the holding vessel to produce heat, and adding the heat from the burning step into the step of reformulating the light fractionate.
16. A process as in claim 14 in which the reformulating step is carried out by reforming the light fractionate at a temperature below 600 C to produce a first

reformate, and reforming the first reformate at a temperature above 650 C to produce a second reformate.

17. A process as in claim 8 in which the fractionating step is carried out by a step selected the group consisting of boiling point fractionation, vacuum fractionation, vacuum distillation, filtration, membrane separation, and adsorption.
18. A process as in claim 8 including the step of burning the light fractionate to drive an engine or a combustor.
19. A process as in claim 8 and further including the steps of wicking the fuel to a heated surface, vaporizing the fuel from the wick, partially mixing the vaporized fuel with air, and ingesting the mixture into an engine.
20. Apparatus for converting a fuel into reformulated fuel for use in a fuel cell or other energy-producing systems, the apparatus comprising a fractionator which fractionates the fuel into a light fractionate and a heavy fractionate, a steam reformer for reforming the light fractionate into a reformate which is suitable for use as a fuel for the fuel cell or other energy-producing device, and a burner which burns a portion of the heavy fractionate combined with air from an air stream to produce heat, and means for adding the heat to the reformer.
21. Apparatus as in claim 20 which is further characterized in that the burner comprises a vaporizer for vaporizing the portion of heavy fractionate, the vaporizer comprising a wick that is formed with a plurality of channels that are sufficiently large to deter carbon that is produced by burning of the heavy fractionate from depositing on the wick.
22. Apparatus as in claim 21 in which the wick is comprised of a ceramic material having a surface, and the surface is formed with a plurality of channels.
23. Apparatus as in claim 20 in which the burner is further comprised of a perforated

screen through which the air stream flows.

24. Apparatus as in claim 23 in which a plurality of the screens are mounted in the burner separated by a gap, and the gap between the screens is larger than 0.1 in and smaller than 0.4 inches.

25. Apparatus as in claim 22 in which a plate is positioned above the screen.